

Appl. No. 10/660,022

Amdt. Dated May 5, 2005

Reply to Office Action of March 21, 2005

The listing of claims will replace all prior versions, and listings of the claims in the application.

1. (currently amended) An integrated expandable forming tool having:

- (a) a body with a mounting stem on its upper surface for mounting in a punch press and a transversely extending channel in its lower surface;
- (b) a wedge-shaped actuator having its smaller end slidably seated in said channel for movement vertically therein and having its larger end normally depending from said body and having an end surface for impacting upon a workpiece, said actuator having upwardly inwardly sloping side surfaces;
- (c) a pair of slide members slidably seated in said channel on opposite sides of said wedge-shaped actuator and having cooperating angular surfaces slidably bearing on said sloping side surfaces of said actuator;
- (d) slide member spring biasing means biasing said slide members against said sloping side surfaces of said actuator; and
- (e) actuator spring biasing means biasing said actuator outwardly of said body, said actuator being driven vertically inwardly of said channel by movement of said larger end against an opposing surface by movement of the ram of the punch press, said inward movement of said actuator pushing said slide members outwardly in said channel so as to project beyond the periphery of said body.

2. (original) The expandable forming tool in accordance with Claim 1 wherein said actuator and said slide members have their lower surfaces cooperatively configured to form a contour in a workpiece against which they are driven.

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3. (original) The expandable forming tool in accordance with Claim 1 wherein said actuator and slide members have their lower surfaces cooperatively configured to cut through a workpiece against which they are driven.

4. (original) The expandable forming tool in accordance with Claim 1 wherein said actuator and slide members have their lower surfaces cooperatively configured to provide edge surfaces in a portion thereof to cut through the workpiece and edge surfaces in portions thereof to form the workpiece thereabout.

5. (original) The expandable forming tool in accordance with Claim 1 wherein said slide member and said larger end of said actuator have their lower surfaces lying in a common plane when said actuator is fully moved inwardly of said body.

6. (original) The expandable forming tool in accordance with Claim 1 wherein said body has depending portions at the upper and outer ends of said channel and said slides have cooperating upstanding portions at their inner ends.

7. (original) The expandable forming tool in accordance with Claim 6 wherein said slide member biasing means comprises compression springs seated between said depending and upstanding portions.

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8. (original) The expandable forming tool in accordance with Claim 1 wherein said stem and said body have aligned axial passages therein opening into said channel, and wherein an actuator retainer is slidably seated in said axial passages.

9. (original) The expandable forming tool in accordance with Claim 8 wherein said actuator biasing means includes a compression spring acting between said actuator retainer and a shoulder in said passage.

10. (original) The expandable forming tool in accordance with Claim 9 wherein said axial passage in said body has a shoulder formed thereabout adjacent its upper end and said actuator retainer has a collar about its lower end, said collar abutting the upper surface of said shoulder to retain said actuator in said body.

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11. (original) A punch and die assembly for forming a contour in a workpiece comprising:

- (a) an expandable forming tool having:
 - (i) a body with a mounting stem on its upper surface and a transversely extending channel in its lower surface;
 - (ii) a wedge-shaped actuator having its smaller end slidably seated in said channel for movement vertically therein and having its larger end normally depending from said body, said actuator having upwardly inwardly sloping side surfaces;
 - (iii) a pair of slide members slidably seated in said channel on opposite sides of said wedge-shaped actuator and having cooperating angular surfaces slidably bearing on said sloping side surfaces of said actuator;
 - (iv) slide member biasing means biasing said slide members against said sloping side surfaces of said actuator; and
 - (v) actuator biasing means biasing said actuator outwardly of said body, said actuator being driven vertically inwardly of said channel by movement of said larger end against an opposing surface, said inward movement of said actuator pushing said slide members outwardly in said channel so as to project beyond the periphery of said body, said slide members and actuator having their lower surfaces cooperatively configured to form a contour in a workpiece against which they are driven; and

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(b) a die having an upper surface configured cooperatively with respect to the lower surfaces of said slide members and actuator to form the workpiece into a desired contour.

12. (original) The punch and die assembly in accordance with Claim 11 wherein said slide member and said larger end of said actuator have their lower surfaces lying in a common plane when said actuator is fully moved inwardly of said body.

13. (original) The expandable forming tool in accordance with Claim 11 wherein said body has depending portions at the upper and outer ends of said channel and said slides have cooperating upstanding portions at their inner ends.

14. (original) The expandable forming tool in accordance with Claim 13 wherein said slide member biasing means comprises compression springs seated between said depending and upstanding portions.

15. (original) The expandable forming tool in accordance with Claim 11 wherein said stem and said body have aligned axial passages therein opening into said channel, and wherein an actuator retainer is slidably seated in said axial passages.

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16. (original) The expandable forming tool in accordance with Claim 11 wherein said actuator biasing means includes a compression spring acting between said actuator retainer and a shoulder in said passage.

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17. (original) A punch and die assembly for forming a contour in a workpiece comprising:

- (a) an expandable forming tool having:
 - (i) a body with a mounting stem on its upper surface and a transversely extending channel in its lower surface;
 - (ii) a wedge-shaped actuator having its smaller end slidably seated in said channel for movement vertically therein and having its larger end normally depending from said body, said actuator having upwardly inwardly sloping side surfaces;
 - (iii) a pair of slide members slidably seated in said channel on opposite sides of said wedge-shaped actuator and having cooperating angular surfaces slidably bearing on said sloping side surfaces of said actuator;
 - (iv) slide member biasing means biasing said slide members against said sloping side surfaces of said actuator; and
 - (v) actuator biasing means biasing said actuator outwardly of said body, said actuator being driven vertically inwardly of said channel by movement of said larger end against an opposing surface, said inward movement of said actuator pushing said slide members outwardly in said channel so as to project beyond the periphery of said body, said actuator and slide members having their lower surfaces cooperatively configured to cut through a workpiece against which they are driven; and

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(b) a die having an upper surface configured cooperatively with respect to the lower surfaces of said slide members and actuator to cut the workpiece.

18. (original) The punch and die assembly in accordance with Claim 17 wherein said slide member and said larger end of said actuator have their lower surfaces lying in a common plane when said actuator is fully moved inwardly of said body.

19. (original) The punch and die assembly in accordance with Claim 17 wherein said body has depending portions at the upper and outer ends of said channel and said slides have cooperating upstanding portions at their inner ends.

20. (original) The punch and die assembly in accordance with Claim 17 wherein said slide member biasing means comprises compression springs seated between said depending and upstanding portions.

21. (original) The punch and die assembly in accordance with Claim 17 wherein said actuator and slide members have their lower surfaces cooperatively configured to provide edge surfaces in a portion thereof to cut through the workpiece and edge surfaces in portions thereof to form the workpiece thereabout.